

22d.—High wind delayed traffic and caused some damage to shipping about New York City and on Long Island Sound.

23d.—A report from Abilene, Tex., stated that the rainfall of the preceding five days, 5.66 inches, exceeded by 1.00 inch the greatest depth of rainfall recorded at that station for a like period in October; streams overflowed and roads were almost impassable.

23d-25th.—Northeast gales prevailed along the Carolina coasts.

27th.—At New Orleans, La., a church steeple was struck by lightning. At Wilgus, Ariz., a house was blown down.

28th.—An exceptionally heavy thunderstorm occurred in the mountains northeast of Pasadena, Cal.; some hail fell, and heavy rain swelled streams, causing some damage.

28-29th.—Heavy gales prevailed on the Great Lakes. About 40 vessels were wrecked or damaged, and much damage was caused in the interior. At Milwaukee, Wis., fire driven by high northwest wind destroyed property to the estimated value of \$5,000,000 on the 28th. At Marquette, Mich., the wind reached a velocity of 46 miles per hour from the north at 7.06 p. m. of the 28th, and continued to blow heavily until the morning of the 29th; the storm was reported the severest ever experienced at that station. A schooner was wrecked 9 miles south of Manistee, Mich. At Chicago, Ill., the wind shifted to northwest and reached a velocity of 58 miles per hour at 4 p. m., 28th, causing damage of a minor character.

At Red Wing, Minn., the wind reached a velocity of 48 miles per hour from the northeast at 9.23 a. m.; the storm was reported the severest of the season at that place. At Alpena, Mich., the gale began 5.20 p. m., 28th, and ended 1.45 p. m., 29th; vessels were detained, and a number of wrecks were reported. At Grand Haven, Mich., a southwest gale began the afternoon of the 28th; the wind shifted to west at 5 p. m., reached a velocity of 52 miles per hour at 11.07 p. m., and continued during the 29th; a schooner was wrecked near Muskegon, and the captain was drowned; and much damage of a minor character was caused in the city.

At Detroit, Mich., the gale began 8 a. m. of the 28th with a gust of wind reaching 45 to 60 miles per hour, and continued until 1.13 p. m. of the 29th. The storm was reported the most destructive in two years. The wind lowered the water in the river at Detroit 4 feet, and the water in Lake Saint Clair was lowered 2 feet. At Toledo the wind reached a velocity of 42 miles per hour at 2.17 a. m. of the 29th. At Sandusky, Ohio, a northwest gale during the 29th lowered the water in the bay 5 feet, grounding several vessels. At Cleveland, Ohio, the wind reached a velocity of 60 miles per hour from the northwest on the 29th; 3 steamers, 5 barges, and 2 schooners went ashore in the harbor. At Buffalo, N. Y., the wind reached a velocity of 42 miles per hour from the west at 12.54 a. m. of the 29th; vessels were delayed.

29th.—At Newburyport, Mass., a thunder, rain, and hail storm prevailed from 5 to 5.30 p. m., causing some damage.

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS.

The following table shows the danger-points at the various river stations; the highest and lowest stages for the month, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, Oct., 1892 (in feet and tenths).

| Stations. | Danger-point on gauge. | Highest water. | | Lowest water. | | Monthly range. |
|---------------------------|------------------------|----------------|--------|---------------|------------------|----------------|
| | | Height. | Date. | Height. | Date. | |
| <i>Red River.</i> | | | | | | |
| Shreveport, La. | 29.9 | 7.3 | 31 | 1.9 | 13, 14 | 9.2 |
| <i>Arkansas River.</i> | | | | | | |
| Fort Smith, Ark. | 22.0 | 10.2 | 24 | 0.7 | 14 | 9.5 |
| Little Rock, Ark. | 23.0 | 11.4 | 27 | 5.4 | 14 | 6.0 |
| <i>Missouri River.</i> | | | | | | |
| Fort Buford, N. Dak. | | 5.4 | 26, 27 | 4.9 | 1 | 0.5 |
| Bismarck, N. Dak. | | 1.8 | 13 | 1.5 | 6, 27-29 | 0.3 |
| Pierre, S. Dak. | 14.0 | 0.7 | 16, 17 | 0.2 | 31 | 0.9 |
| Sioux City, Iowa | 18.7 | 7.0 | 19 | 4.5 | 31 | 2.5 |
| Omaha, Nebr. | 18.0 | | | | | |
| Kansas City, Mo. | 21.0 | 7.1 | 24 | 5.0 | 11, 12, 17 | 2.1 |
| <i>Mississippi River.</i> | | | | | | |
| Saint Paul, Minn. | 14.0 | 3.1 | 2 | 2.2 | 29-31 | 0.9 |
| La Crosse, Wis. | 11.8 | 2.4 | 1 | 1.8 | 29, 31 | 0.6 |
| Dubuque, Iowa | 16.0 | 3.4 | 1 | 2.7 | 16, 17 | 0.7 |
| Davenport, Iowa | 15.0 | 2.4 | 1 | 1.6 | 14 | 0.8 |
| Keokuk, Iowa | 14.0 | 2.3 | 2 | 1.3 | 15, 18-20, 22-27 | 1.0 |
| Hannibal, Mo. | 17.0 | 3.3 | 1, 2 | 2.2 | 21-27, 30 | 1.1 |
| Saint Louis, Mo. | 30.0 | 6.8 | 1, 2 | 5.0 | 18, 19, 24, 25 | 1.8 |
| Cairo, Ill. | 40.0 | 6.7 | 1, 4 | 3.9 | 27-30 | 2.8 |

Heights of rivers—Continued.

| Stations. | Danger-point on gauge. | Highest water. | | Lowest water. | | Monthly range. |
|-------------------------------------|------------------------|----------------|-------|---------------|--------|----------------|
| | | Height. | Date. | Height. | Date. | |
| <i>Mississippi River—Continued.</i> | | | | | | |
| Memphis, Tenn. | 33.0 | 4.9 | 1 | 1.7 | 29-31 | 3.2 |
| Vicksburg, Miss. | 41.0 | 5.2 | 1, 2 | 1.0 | 30 | 6.2 |
| New Orleans, La. | 13.0 | 5.0 | 2 | 3.0 | 31 | 2.0 |
| <i>Ohio River.</i> | | | | | | |
| Parkersburg, W. Va. | 38.0 | 2.3 | 11 | 1.0 | 30, 31 | 1.3 |
| Cincinnati, Ohio | 45.0 | 6.0 | 1 | 3.6 | 29, 31 | 2.4 |
| Louisville, Ky. | 24.0 | 3.8 | 2 | 2.4 | 29-31 | 1.4 |
| <i>Cumberland River.</i> | | | | | | |
| Nashville, Tenn. | 40.0 | 1.9 | 1, 3 | 0.1 | 27-31 | 2.0 |
| <i>Tennessee River.</i> | | | | | | |
| Chattanooga, Tenn. | 33.0 | 2.2 | 1 | 1.1 | 26-31 | 1.1 |
| Knoxville, Tenn. | 29.0 | | | | | |
| <i>Monongahela River.</i> | | | | | | |
| Pittsburg, Pa. | 29.0 | 6.0 | 1 | 5.0 | 27 | 1.0 |
| <i>Savannah River.</i> | | | | | | |
| Augusta, Ga. | 32.0 | 7.3 | 2 | 5.9 | 17 | 1.4 |
| <i>Willamette River.</i> | | | | | | |
| Portland, Oregon | 15.0 | 3.0 | 8 | 0.6 | 31 | 2.4 |
| <i>Susquehanna River.</i> | | | | | | |
| Harrisburg, Pa. | 17.0 | 1.4 | 3 | 0.5 | 31 | 0.9 |
| <i>Alabama River.</i> | | | | | | |
| Montgomery, Ala. | 48.0 | 2.3 | 1 | 0.7 | 27-31 | 1.6 |

The stage of water in the Ohio River and tributaries and in streams of the east Gulf states was very low throughout the month.

ATMOSPHERIC ELECTRICITY.

THUNDERSTORMS.

Description of the more severe thunderstorms reported for the month is given under "Local storms."

Thunderstorms were reported as follows: East of the Rocky Mountains they were reported in the greatest number of states, 16, on the 4th; in 10 to 15 on the 1st, 3d, 7th, 8th, 12th, 13th, 14th, and 17th; in 5 to 9 on the 2d, 5th, 10th, 11th,

16th, 18th, 19th, 20th, 29th, 30th, and 31st; and in 1 to 4 on the 6th, 9th, 15th, 21st, and 23d to 28th. The 22d was the only date on which thunderstorms were not reported.

East of the Rocky Mountains thunderstorms were reported on the greatest number of dates, 21, in Texas; on 12 in Florida; on 5 to 10 in Colorado, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Minnesota, Missouri, Nebraska, New York, Ohio, Oklahoma, Pennsylvania, South Dakota,

and Wisconsin; and on 1 to 4 in Alabama, Arkansas, Connecticut, Georgia, Indian Territory, Kentucky, Maine, Maryland, Massachusetts, Mississippi, Montana, New Hampshire, New Jersey, North Carolina, North Dakota, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, and West Virginia.

West of the Rocky Mountains thunderstorms were reported in Arizona on the 1st, 7th, 8th, 27th, 28th, and 29th; in California on the 1st, 4th to 8th, 10th, 14th, 15th, 16th, 26th, 27th, and 28th; in Nevada on the 6th; in New Mexico on the 19th, 20th, 28th, 29th, and 30th; in Oregon on the 10th and 15th; in Utah on the 1st, 9th, 11th, 16th, and 31st; and in Washington on the 8th and 10th. No thunderstorms were reported in Delaware, the District of Columbia, Idaho, and Wyoming.

AURORAS.

The more widely observed auroral displays of the month were reported from New England to Washington and southward to the middle Rocky Mountain region on the 12th; from the Lake region to Washington and in the middle Rocky Mountain and plateau regions on the 13th; from New England to the Dakotas and to southern Illinois on the 17th; from the Lake region to the Dakotas and middle Rocky Mountain region on the 18th; and from the Lake region over the Missouri Valley and northern plateau region on the 21st.

Notable auroral displays of October, 1892.

| Date. | Station. | Extent of display. | | Remarks. |
|-------|------------------------------|--------------------|-----------|--|
| | | Azimuth. | Altitude. | |
| 2 | Erie, Pa. | Cov'd 135 | 45 | Flashes of light. |
| 11 | Northfield, Vt. | 165 to 225 | 20 | White light. |
| 12 | Eastport, Me. .... | ..... | 25 | Waves of light moving rapidly from west to east. |
| 12 | Marquette, Mich. | 120 to 240 | 75 | An arch, which gave way to a diffused pale green light, with broad flashing beams. |
| 12-13 | Fort Buford, N. Dak. | 135 to 250 | 40 | Irregular arch, with brilliant streamers. |
| 12 | Havre, Mont. .... | ..... | 60 | An arch, with beams of light. |
| 12 | Helena, Mont. | Cov'd 90 | 30 | Yellow light, with beams. |
| 12 | Miles City, Mont. .... | ..... | 30 | An arch, with "merry dancers." |
| 13 | Marquette, Mich. | 135 to 180 | 45 | Faint arch. |
| 15 | Moorhead, Minn. .... | ..... | ..... | Dark segment, with shafts of yellow light. |
| 17 | Eastport, Me. .... | ..... | 35 | An arch, with beams and waves of brilliant light. |
| 17 | Northfield, Vt. | 160 to 225 | 36 | White light, with streamers. |
| 17 | Malone, N. Y. .... | ..... | ..... | Double arch, with streamers to zenith. |
| 17 | Miles City, Mont. .... | ..... | 60 | "Merry dancers." |
| 18 | Alpena, Mich. | 90 to 180 | 30 | Beams of white light, with a lateral movement from west to east. |
| 17-18 | Cheboygan, Mich. .... | ..... | 70 | Brilliant streamers. |
| 18 | Grand Haven, Mich. | 135 to 225 | 15 | White arch, with pale streamers. |
| 18 | Marquette, Mich. | 135 to 225 | 30 | Obscured by clouds. |
| 18 | Sault Ste. Marie, Mich. | 135 to 270 | 40 | Tea-green color, with yellow beams moving from west to east. |
| 18 | Juneau, Wis. | 145 to 240 | 14 | With streamers. |
| 18 | Saint Paul, Minn. | 170 to 200 | 40 | Pale light. |
| 21-22 | Helena, Mont. | In the n. | 30 | Pale yellow light, with beams. |

STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for October, 1892, of the directors of the various state weather services:

ALABAMA.

Temperature.—Maximum, 94, at Daphne, 3d and 6th; minimum, 28, at Florence and Scottsboro, 28th; greatest monthly range, 61, at Brewton; least monthly range, 35, at Fayette.

Precipitation.—Greatest monthly, 3.03, at Mobile; least monthly, 0.00, at Gadsden.—*P. H. Mell, Observer, Weather Bureau, Auburn, director.*

ARIZONA.

Temperature.—Maximum, 110, at Fort Mohave, 5th; minimum, 22, at Whipple Barracks, 17th; greatest monthly range, 72, at San Carlos; least monthly range, 41, at Dos Cabezas.

Precipitation.—Greatest monthly, 1.83, at Walnut Ranch; least monthly, 0.00, at Fort Mohave, Gila Bend, Rancho del Pueblo, and Yuma.

Wind.—Prevailing direction, southwest.—*J. C. Hayden, Observer, Weather Bureau, Tucson, director.*

ARKANSAS.

Temperature.—The mean was 2.5 above the normal; maximum, 92, at Keesees Ferry, 3d, and at Hot Springs and Texarkana, 7th; minimum, 27, at Melbourne, 26th and 27th; greatest monthly range, 63, at Keesees Ferry and Hot Springs; least monthly range, 39, at Mount Nebo.

Precipitation.—The average was 1.34 above the normal; greatest monthly, 9.07, at Dallas; least monthly, 0.43, at Black Rock.

Wind.—Prevailing direction, south.—*M. F. Locke, Commissioner of Agriculture, Little Rock, director; F. H. Clarke, Local Forecast Official, Weather Bureau, assistant.*

CALIFORNIA.

Temperature.—Maximum, 103, at Needles, 3d; minimum, 26, at Susanville, 17th; greatest monthly range, 70, at Winchester; least monthly range, 31, at Berkeley.

Precipitation.—Greatest monthly, 5.84, at Crescent City; least monthly, 0.00, at Needles and Winchester.

Wind.—Prevailing directions; west and northwest.—*J. A. Barwick, Observer, Weather Bureau, Sacramento, director.*

COLORADO.

Temperature.—The mean was about normal, except in the central and northwestern tiers of counties where it was about 4.0 below; maximum, 97, at Crook, 4th; minimum, —4, at San Luis, 14th; greatest monthly range, 83, at Delta; least monthly range, 49, at Glen Eyrie.

Precipitation.—The average was greatly above the normal; greatest monthly, 4.30, at Climax; least monthly, 0.00, at a number of stations.—*J. J. Gilligan, Observer, Weather Bureau, Denver, director.*

FLORIDA.

Temperature.—Maximum, 91, at Bristol, 2d; minimum, 36, at Orange City, 29th; greatest monthly range, 54, at Orange City; least monthly range, 28, at Key West.

Precipitation.—Greatest monthly, 14.00, at Jupiter; least monthly, 1.28, at Pensacola.

Wind.—Prevailing direction, northeast.—*E. R. Demain, Observer, Weather Bureau, Jacksonville, director.*

GEORGIA.

Temperature.—Maximum, 90, at Darien, 13th, at Eastman, 8th, at Thomasville, 2d, and at Lagrange, 17th, 18th, and 19th; greatest monthly range, 60, at Lagrange; least monthly range, 32, at Macon.

Precipitation.—Greatest monthly, 2.11, at Blakely; least monthly, 0.00, at Lafayette and Hawkinsville.

Wind.—Prevailing direction, east.—*Park Morrill, Local Forecast Official, Weather Bureau, Atlanta, director.*

IDAHO.

Temperature.—Maximum, 97, at Payette, 1st, and at Boise Barracks, 3d; minimum, 15, at Lake, 20th; greatest monthly range, 66, at Payette; least monthly range, 60, at Boise Barracks.

Precipitation.—Greatest monthly, 0.77, at Boise Barracks; least monthly, 0.15, at Lake.

Wind.—Prevailing direction, southwest.—*J. H. Smith, Observer, Weather Bureau, Idaho Falls, director.*

ILLINOIS.

Temperature.—The mean was 1.5 above the normal of the last 17 years; maximum, 94, at Muddy Valley, 1st; minimum, 13, at Philo, 30th.

Precipitation.—The average was 1.97 below the normal of the last 14 years; greatest monthly, 2.74, at Saint Johns; least monthly, trace, at Decatur.

Wind.—Prevailing direction, northwest.—*John Craig, Observer, Weather Bureau, Springfield, director.*

INDIANA.

Temperature.—The mean was 1.4 above the normal; maximum, 91, at Marengo, 3d; minimum, 15, at Marion, 30th; greatest monthly range, 65, at Marion; least monthly range, 28, at Irvington.

Precipitation.—The average was 1.61 below the normal; greatest monthly, 3.00, at Michigan City; least monthly, trace, at Point Isabel and Marion.

Wind.—Prevailing direction, southwest.—*Prof. H. A. Huston, Lafayette, director; C. F. R. Wappenhans, Local Forecast Official, Weather Bureau, assistant.*